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ABSTRACT

This document is a curriculum guide for a program in computer service technology developed at Schoolcraft College, Livonia, Michigan. The program is designed to give students a strong background in the fundamentals of electricity, electronic devices, and basic circuits (digital and linear). The curriculum includes laboratory demonstrations of the principles taught in class, affording practical experience in fabrication, instrumentation, and presentation. The curriculum guide outlines the courses to be included in the computer service technology program, suggests employment options, provides goal statements, and identifies existing and needed program equipment. The guide also describes the classroom and laboratory settings needed, outlines specialty courses, suggests a sequence of courses, and includes a short description of the Schoolcraft College program evaluation system. (KC)

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COMPUTER SERVICE TECHNICIAN
"COMPS"

Curriculum Grant 1985

Submitted June 28, 1985

Schoolcraft College
Livonia, MI 48152

Louis A. Reibling, Ph.D.
Dean of Instruction

U.S. DEPARTMENT OF EDUCATION
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PROGRAM IDENTIFIERS, CODES

15.0402

INTRODUCTION

This program is designed to give students a strong background in the fundamentals of electricity, electronic devices and basic circuits--digital, and linear. The curriculum includes laboratory demonstration of the principles taught in class affording practical experience in fabrication instrumentation and presentation. Realizing that electronic equipment interfaces other forms of energy, there are related courses in electro-mechanical devices.

A computer service technician services computer systems (mainframes, microprocessors, and peripherals) to keep them operating efficiently. Routinely adjusts, oils, and cleans electromechanical parts, and checks electronic equipment for defective components or circuits. Troubleshoots and repairs computers, using faulty circuits, solder broken connections, and repair mechanical parts, as needed. Assists in installation of new equipment. Keeps service records.

A cooperative program is required in which they receive credit for work in one of the colleges computer laboratories.

Hand tools and fabrication tools required for this program will be purchased by the student.

The student who satisfactorily completes the Computer Service Technology Program qualifies for an Associate in Applied Science Degree.

IDENTIFICATION OF SPECIALITY COURSES

COMPS 105 BASIC ELECTRICITY
This course will provide the student with an understanding of D. C. (direct current) and A. C. (alternating current) principles. Course material covered includes: use of meters, series, parallel, and compound circuits, Kirchhoff, inductance and capacitive reactance, time constants. Resonance and filters will also be introduced.
PREREQUISITE: MATH 45 or equivalent

COMPS 125 TECHNICAL PROGRAMMING (2-2) 3 Cr. Hrs.
The students will write a series of technical related programs in the BASIC language. These programs will include assignments on Plotting, Data Files, and Disk Files. Students will use the computer to solve problems relating to their degree program.
PREREQUISITE: Student must be enrolled in a technical program that requires BASIC.

COMPS 145 COMPUTER SERVICE AND REPAIR (2-4) 4 Cr. Hrs.
Students will learn to diagnosis problems and repair to component level, the typical malfunction of a personal computer. We will use educational demonstration models to begin with and then progress to the commercial Zenith Z 100 models as a typical P. C. Students will also perform diagnosis and repair on selected models of IBM, Radio Shack and Apple computers as they are available.
PREREQUISITE: ELECT 223

COMPS 245 COMPUTER PERIPHERAL SERVICE AND REPAIR (2-4) 4 Cr. Hrs.
Students will learn to diagnosis problems and repair to the component level. The typical malfunction in computer modems, disk drives, printers, cpu, and interconnecting cabling and interfacing devices. We will use educational demonstration models as a starting point and progress to commercial units of Zenith, IBM, Radio Shack and Apple.
PREREQUISITE: COMPS 145

COMPS 265 Circuit Analysis and Repair Internship (4-4) 6 Cr. Hrs.
Students will be assigned to a college computer laboratory as a paid "on call" intern to maintain all models of computers and computer peripherals. They will also perform perodic prevention maintenance on instructional computers and keep records on each.
COREQUISITE: COMPS 245

IDENTIFICATION OF SUPPORT COURSES

ELECT 114 INTRODUCTION TO MICROPROCESSORS (2-1-1) 3 Cr. Hrs.
Computer: Architecture, Components, Arithmetic, numbering systems, and codes. Representative Microprocessor commands, and elementary programming for the 6800 Microprocessor. Input/Output and interfacing with the outside world.
PREREQUISITE: MATH 51 or Equivalent

ELECT 116 DIODES AND TRANSISTORS (2-2) 3 Cr. Hrs.
Discusses internal construction and function of diodes, bipolar transistors and field effect transistors. Explains characteristic curves, and method of biasing of various configurations. Deals with operation of transistors as switches. Laboratory sessions help students gain experience working with these components and demonstrate principles taught in class.
CO-REQUISITE: COMPS 105 or ELECT 111

ELECT 126 ELECTRONIC FABRICATION AND ASSEMBLY (1-4) 3 Cr. Hrs.
Course will enable the student to generate documentation, fabricate and assemble electronics equipment.
PREREQUISITE: ELECT 116

ELECT 222 DIGITAL CIRCUITS (3-2) 3 Cr. Hrs.
The course presents the characteristics of a pulse and the response of RC and RL circuits including the transformer to a pulse input. It demonstrates the switching functions of diodes and transistors and their applications in gating circuits. Also included are integrated circuit gates, flip - flops, single - shots and astable multi-vibrators. The basic principles of DTL, TTL, ECL and CMOS are discussed. Laboratory experiments emphasize the lecture principles, and introduce pulse measurements and equipment.
PREREQUISITE: COMPS 105 or ELECT 111 and ELECT 116

ELECT 223 DIGITAL LOGIC CIRCUITS (4-2) 5 Cr. Hrs.
The course acquaints students with Boolean algebra (emphasizing NAND and NOR,) and various medium scale integrated circuits like exclusive OR, encoders, decoders, multiplexors, adders, counters and shift registers. Also included are memory (core, RAN and ROM), and bidirectional line drivers. The laboratory work coincides with classroom lecture material utilizing integrated circuits almost exclusively.
PREREQUISITE: ELECT 222

ELECT 209 AMPLIFIERS (4-2) 5 Cr. Hrs.
The student will first study the transistor AC amplifier. This will be followed by an introduction to the operational amplifier as a circuit element. Various op-amp characteristics will be studied, such as gain, offset common mode rejection, differential mode, high frequency response and slow rate. Op-amp circuit applications will be of both linear and non-linear configurations. Specific circuits,

SUPPORT COURSES CONTINUED

covered will include inverting and non-inverting amplifiers, filters, oscillators, comparators, summers, integrators and differentiators. Finally, power supply regulator integrated circuit devices will be explained.
PREREQUISITE: ELECT 116

IDENTIFICATION OF GENERAL EDUCATION COURSES

ENG	PLACEMENT BASED UPON A.S.S.E.T. TEST SCORES - 6 Cr. Hrs.
MATH	PLACEMENT BASED UPON A.S.S.E.T. TEST SCORES - 5 Cr. Hrs.
POL S 105	SURVEY OF AMERICAN GOVERNMENT (3-0) 3 Cr. Hrs. Survey of the American political system, including an analysis of decision makers, power, and controversial issues, at the national, state and local governmental levels.
ELECTIVE	Must have approval of department - 3 Cr. Hrs.

EMPLOYMENT OPTIONS

For the student graduating from the Computer Servicing Program, the most common employment option is for entry level servicing of computer and computer related equipment. This includes servicing and installation in areas of personal computers, medical test equipment, environmental control systems, industrial control systems, and many other areas where computers are used.

Some of the graduates will find employment as field service representatives, sales and technical sales support.

PROGRAM GOALS STATEMENT

Upon the completion of the Associate Degree, the students will be able to:

1. Perform tests on mechanical, electrical, or thermal components or systems: prepare appropriate technical reports covering the tests.

2. Obtain, select, compile, and use technical information from precise measuring and recording instruments.

3. Analyze and interpret information obtained from precise measuring and recording instruments and special procedures and techniques.

4. Prepare or interpret engineering drawings and sketches: write detailed specifications or procedures for work.

5. Plan, supervise, or assist in the installation and inspection of micro computer apparatus, equipment, and control systems.

6. Operate, maintain, and repair micro computers and equipment, including periphal systems.

7. Understand the concept of machine language, assembly language, higher level language and general operating systems.

IDENTIFICATION OF EXISTING PROGRAM EQUIPMENT

12	Zenith Z 100 Computer Systems
2	Zenith Z 125AA Printers
2	Radio Shack TRS 80 Model III
1	Radio Shack TRS 80 Model II
1	Radio Shack DMP 2100 Printer
1	Zenith Heathkit ET 100 Educational Computer Learning Center
13	Work Benches
30	Stools

INDICATION OF NEEDED ADDITIONAL EQUIPMENT

Chairs	12	$ 3,000.00
Work Benches	6	1,260.00
Computer Repair Trainers	6	15,000.00
Disk Drive Trainers	6	9,000.00
Oscilloscopes	6	13,200.00
Logic Analyzers	6	18,000.00
RS 232 Breakout Boxes	6	1,800.00
Printers	6	3,000.00
R.G.B. Monitor	6	3,000.00
Modems A & B Sync	6	4,200.00
Hard Disk Drive	1	3,850.00

CLASSROOM/LABORATORY SETTINGS DESCRIBER

The current lab area is a part of T-260, which contains approximately 600 square feet of laboratory space for student use in disassembling and repair of computer systems.

INDICATION OF NEEDED ADDITIONAL CLASSROOM/LABORATORY

As the program grows, additional laboratory and classroom space will be needed. By 1987, 600 square feet and another classroom similar to T-320 will be needed.

NEW COURSE

ADMINISTRATIVE REVIEW FORM

*Course Title: BASIC ELECTRICITY (COMPS 105)

*Implementation Date: WINTER '86

*Rationale for the Course/Program: First course in the Computer Servicing Program. It is a prerequisite for following courses.

*Number of Seats Needed: twenty-four (24)

Project Enrollment:

	Fall	Winter	Spring	Summer
*1st year	-0-	24	-0-	-0-
*2nd year	24	24	-0-	-0-

*Transferability:

College or University	Approval Date
L. I. T. Dr. Dick Michael	2+2 Program Under Development
WAYNE Dr, Stocker	5/30/85 2+2 Program
FERRIS Dr. Frank Sager	5/30/85 2+2 Program

Faculty Competence:

*Degree: MSEE of BSEE + 2 years electrical experience.

*Experience: 2 years experience in related electronics.

*Applicable Prof. Development/Cont. Educ.: None.

*Name: Jerry Wale

Total Expenses:	1st year	2nd year	3rd year
*Expense Faculty	1,475	2,945	2,945
*Supplies	300	500	500
Administrative	1,200	1,800	2,100
Total	2,975	5,245	5,645

Total Income:	1st year	2nd year	3rd year
*Tuition	1,380	1,840	1,840
*Lab Fee	120	240	300
State Aid	1,753	3,507	3,507
Total	3,253	5,587	5,647

Relationship to Master Plan: This course is required for the new Computer Service Program. The program is part of the college's five (5) year plan.

*To be filled in by person submitting course

SYLLABUS
COMPS 105
BASIC ELECTRICITY

6 Credit Hours, 15 Weeks, 4 Lecture, 4 Lab per week

PREREQUISTE: NONE

CO-REQUISITE: MATH 51 or Equivalent

Course Aims and Objectives:

This course will provide the student with an understanding of D. C. (direct current) and A. C. (alternating current) principles. Course material will include the following areas:

Use of meters, measuring voltage, current and resistance, series, parallel and compound circuits, Kirchhoff's Law, the sine wave, inductive and capacitive reactance, time constants, resonance and an introduction to filters. The VOM and the oscilloscope are the primary laboratory instruments the student will be using. A written report will (generally) be required for each experiment.

Methods of Grading and Examinations:

Typically seven (7) quizzes will be given and the lowest score dropped. All testing will be closed book and notes. Students will be expected to use calculators on all tests.
Lab reports are required for a passing grade.

Laboratory Experiments	20%
Class Tests	60%
Final Exam	20%

Texts:

Basic Electronics, by Grob, McGraw-Hill

Experiments in Basic Electricity

Supplemental Text:

Electricity One - Seven Series, Hayden Books.

WEEK #1	INTRODUCTION	Safety, Lab Procedures Lab Partners
	OHM'S LAW	Meter Scales
WEEK #2	RESISTORS	Measuring Voltages
	TEST	Color Code
WEEK #3	SERIES CIRCUITS	Measuring Current
	PARALLEL CIRCUITS	Voltage Drops
WEEK #4	TEST	Parallel Circuits
	COMPOUND CIRCUITS	Internal Make-up or Resistance
WEEK #5	COMPOUND CIRCUITS	Combined Series/Parallel Circuits
	VOLTAGE AND CURRENT DIVIDER CIRCUITS	Voltmeter Construction
WEEK #6	TEST	Ammeter Construction
	KIRCHHOFF'S LAW	Open
WEEK #7	KIRCHHOFF'S LAW	Voltmeter Loading Effect
	NETWORK THEOREMS	Kirchhoff's Circuit Verify
WEEK #8	TEST	Superposition
	AC CIRCUITS	Introduction to Scope Lecture
WEEK #9	INDUCTANCE	Scope II
	INDUCTANCE	Characteristics of the Sine Wave
WEEK #10	CAPACITANCE	Measurement of Indudtive
	TEST	Reactance
		Open

Continued...

		LABS
WEEK #11	TIME CONSTANTS RC & RL	Measurement of Capacitive Reactance
	R L CIRCUITS	Capacitive Time Constants
WEEK #12	R C & R C L CIRCUITS	Phase Measurement II
	TEST	Open Lab
WEEK #13	RESONANCE	Freq. Response of A C Measuring instruments
	FILTERS	Series Resonance
WEEK #14	TEST	Filters
	REVIEW	Open
WEEK #15	FINALS	No Lab

SCHOOLCRAFT COLLEGE

Course Description Form:

Prepared by:

Jerry Wale Date 9/4/85

Date

Date

Reviewed by:

Date

Date

Date

Date

Date

DEPT. COURSE NO: COMPS 105

COURSE TITLE: BASIC ELECTRICITY

Lec. Hrs. 4 Lab. Hrs. 4 Credit Hrs. 6

CATALOG DESCRIPTION: (Indicate in paragraph form what will be taught in the course. Include prerequisites for the course.)

This course will provide the student with an understanding of D. C. (direct current) and A. C. (alternating current) principles. Course material covered includes: Use of meters, series, parallel, and compound circuits, Kirchhoff's Law, inductance and capacitive reactance, time constants. Resonance and filters will also be introduced.

PREREQUISITE: MATH 51 or Equivalent

COURSE OBJECTIVES: (Begin each course objective with "the student will be able to . . . ".)

The student will be able to:

1. Solve problems using Ohm's law.
2. Solve series circuits.
3. Solve parallel circuits.
4. Solve compound circuits

5. Understand Kirchhoff's Laws.
6. Define Sine Wave.
7. Solve problems involving capacitors and inductors.
8. Solve simple time constant problems.

Course Description Form (continued)

COURSE CONTENT/OUTLINE: (Write the major topics for the course. Under each topic include the units.)

I Ohm's Law
- A. Resistors

II Basic Circuits
- A. Series
- B. Parallel
- C. Compound

III Advanced Circuits
- A. Kirchhoff
- B. Voltage Dividers
- C. Current Dividers

IV A C CIRCUITS
- A. Define Sine Waves

V Inductance
- A. Define
- B. Circuits
- C. Time Constants

VI Capacitance
- A. Define
- B. Circuits
- C. Time Constants

VII R L & R C L CIRCUITS
A. Phase Shifts

VIII Resonance & Filters

Course Description Form (continued)

METHOD OF EVALUATION: (Indicate how the competencies achieved will be translated into the grading system.)

Typically seven (7) tests will be given and the lowest score dropped. All testing will be closed book and closed notes. Students will be expected to use calculators on all tests.

Lab reports are required for a passing grade.

A - 90-100%
B - 80- 89%
C - 70- 79%
D - 60- 69%
F - 0- 59%

Laboratory Experiment Reports	20%
Class Tests	60%
Final Exam	20%

COURSE SYLLABUS: (This should be a companion document distributed to the students on the first day of class. It should include the Instructional Goals, Performance objectives and specific method of evaluation.)

NEW COURSE

ADMINISTRATIVE REVIEW FORM

*Course Title: TECHNICAL PROGRAMMING (COMPS 125)

*Implementation Date: FALL 1985

*Rationale for the Course/Program: This course will give the students the technical aspects of programming instead of the Business Departments' approach.

*Number of Seats Needed: 24

Project Enrollment:

	Fall	Winter	Spring	Summer
*1st year	48	48	0	0
*2nd year	48	48	48	0

*Transferability:

College or University	Approval Date
L.I.T. - Contact Dr. Dick Michal	2+2 Program under development
WAYNE - Contact Dr. Stocker	5/30/85 for 2+2
FERRIS - Contact Dr. Frank Sager	5/30/85 for 2+2

Faculty Competance:

*Degree: MSEE or BSEE plus three years technical .

*Experience: Strong electronics background and proven ability to teach programming.

*Applicable Prof. Development/Cont. Educ.: _____

*Name: Jerry Wale

Total Expenses:	1st year	2nd year	3rd year
*Expense Part Time & Faculty Supplemental	$ 5,890	$ 8,840	$ 8,840
*Supplies	200	400	600
Administrative	1,200	1,800	2,100
Total	$ 7,290	$ 11,040	$ 11,540

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Total Income:	1st year	2nd year	3rd year
*Tuition	$ 5,520	$ 5,520	$ 5,520
*Lab Fee	240	240	400
State Aid	6,072	6,072	6,072
Total	$ 11,832	$ 11,832	$ 11,992

Relationship to Master Plan: This course is listed in the master plan for the Electronics Department. This course is more in line with the technical students needs than the CIS 129 course students now take. The program is a part of the college's five year plan.

*To be filled in by person submitting course

SCHOOLCRAFT COLLEGE

Course Description Form:

Prepared by:

J. Wale Date 5/20/85

_____ Date _____

_____ Date _____

Reviewed by:

_____ Date _____

_____ Date _____

_____ Date _____

_____ Date _____

_____ Date _____

DEPT. COURSE NO: COMPS 125

COURSE TITLE: TECHNICAL PROGRAMMING

Lec. Hrs. 2 Lab. Hrs. 2 (Split Lab) 2-2 Credit Hrs. 3

CATALOG DESCRIPTION: (Indicate in paragraph form what will be taught in the course. Include prerequisites for the course.)

The application of the Basic Language to solve some typical technical problems. Including the documention, writing and testing of programs that use the most commonly used commands.

The student will use the computer to solve problems related to their degree programs. Assignments on plotting, data files and disk files will also be covered.

PREREQUISITE: Student must be enrolled in a technical program that requires BASIC.

COURSE OBJECTIVES: (Begin each course objective with "the student will be able to . . . ".)

THE STUDENT WILL BE ABLE TO:

1. Write simple Basic programs related to their degree program.
2. Use the computer to solve typical technical problems.
3. Document the programs in a readable form.
4. Use the most common commands of Basic.

5. Create and use disk files.

6. Display data as graph, plot, or in tables.

Course Description Form (continued)

COURSE CONTENT/OUTLINE: (Write the major topics for the course. Under each topic include the units.)

SEE NEXT PAGE

COURSE CONTENT:

Listed below are the basic units of content.

I. INTRODUCTION
   A. What is a Computer, Hardware, Software, Intepracter, Compiler.
   B. INSTRUCTIONS: Print, List, Run, Rem, Delete, New, Save, Load, Renumbe
      Plot.

II. ARITHMETIC & DESIGNING PROGRAMS
   A. Define: Operators, Expression, Variable, Equations, Documents, Code,
      Errors.

III. USING READ & DATA STATEMENTS
   A. Define: Loop, Branch, String, Data, Terminator, Algorithm.
   B. INSTRUCTIONS: GoTo, If-Then, Read, Data, Clear

IV. PRINTER CONTROL
   A. Tab, SPC, Spaces, Print Using, INT, STRS, Len

V. INTERACTIVE PROGRAMS
   A. In Put Restore, Promts, Range Checking

VI. SUMMARIZING
   A. Totals, Sub Totals, Counters, Inc.

VII. PROGRAMMING IN MODULES
   A. Modules, Sub Modules, Flags, Gosub, Return

VIII. CONTROLLED LOOPS
   A. Nested, Loops, For-To-Step, Next, While, Wend

IX. TABLES
   A. Tables, Elements, Subscript, Array, Dim, Menu, On-X- Goto

X. SORTING
   A. Swap, Bubble, Scan Sort

XI. ADVANCED HANDLING OF CHARACTER DATA
   A. Get, In Keys, Inputs, Lefts, Rights, ASC, Len, CHRS, Val, STRS, +

XII. SEQUENTIAL DATA FILES
   A. Files, Record, Field, Sequential, Disk

XIII. RANDOM DATA FILES
   A. Random Data, File, Record Number, Put Get.

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Course Description Form (continued)

METHOD OF EVALUATION: (Indicate how the competencies achieved will be translated into the grading system.)

A quiz will be given at the end of each instructional unit, the lowest score will be dropped.

A report is required for each program written, the lowest score will be dropped.

Quizes 25%

Reports 50%

Final 25%

A 90-100%

B 80-89%

C 70-79%

D 60-69%

F 0-59%

COURSE SYLLABUS: (This should be a companion document distributed to the students on the first day of class. It should include the Instructional Goals, Performance objectives and specific method of evaluation.)

SYLLABUS
Computer Service Technician Program
Technical Programming
Course COMPS 125

3 Credit Hours
Prerequisite: None

Course Aims and Objectives:

The main purpose of this course is to introduce BASIC as a tool for the technician. The BASIC language will be covered as well as different programming organization techniques,(i.e., flow charting, pseudo coding and others). Programming assignments will be given that reflect the needs of the discipline.

Methods of Grading & Examinations:

Typically 6 (six) quizzes will be given and the lowest score dropped. Most programming will be done outside of the classroom, with scheduled lab time used for group efforts. Reports must be turned in for all programming.

QUIZZES	25
REPORTS	50
FINAL	25

Texts:

"BASIC PROGRAMMING: A Structured Approach"
by Clark & Drum (Southwestern)

Supplemental Information:

Z-BASIC MANUALS by Microsoft
Z-100 Operators Manual
"Technical Basic" by Vincent Kassab (Prentice Hall)

PROGRAM REPORTS:

Each program must contain at least the following information:

1. Cover Page (Course Name, Number, Program Set, Program Number, Data, Your Name)

2. Purpose of the program (be brief)

3. Documentation - as is appropriate
   A. Printer (or CRT) spacing chart
   B. Flow charts or other suitable organization techniques
   C. Program listing
   D. Lab assistant signature verifying a functioning program

4. Your comments on the program

Standard requirement for any report is:
1. Use ink
2. Be neat
3. Do not use "tear out edges" on your report pages
4. One staple, upper left hand corner (please - no notebooks)
5. Complete all assignments on time

WEEK #1 Introduction (what is a computer, computer hardware, software, interpreter, compiler, machine code)
CHAPTER #1. (PRINT, LPRINT, LIST, RUN, REM, END, LLIST, DELETE, NEW, SAVE, LOAD, RENUMBER, PLOT)
H.W. p 15, #1, 2, &3: p 14 Enrichment
Programming Assignment Group A

WEEK #2 CHAPTER #2. Arithmatic & disigning programs (OPERATORS, EXPRESSION, VARIABLE, EQUATION, DOCUMENTS, CODE, CODING ERRORS, LOGIC ERRORS)
H.W. p 26, part 1: p 27, part 2 & 3; p 28 steps 9-12;
Programming Assignment Group B

WEEK #3 CHAPTER #3. Using Read & Data Statements.
(LOOP, BRANCH, IF, STRING, DATA TERMINATOR, ALPHANUMERIC DATA, ALGORITHM, GOTO, IF-THEN, READ, DATA, CLEAR)
H.W. p 49, # 1, 2, & 3;
Programming Assignment Group C

WEEK #4 PRINTER CONTROL
(TAB, SPC, SPACE$, PRINT USING, INT, STR$, LEN)
H.W. p 94 All
Programming Assignment Group C

WEEK #5 INTERACTIVE PROGRAMS
(INPUT, RESTORE, PROMPTS, RANGE CHECKING)
H.W. p 121 All

WEEK #6 SUMMARIZING
(TOTALS, SUB TOTALS, COUNTERS, INCREMENTING)
H.W. p 149, 1,2,3; p 150-1, 1-4
Programming Assignment Group F

WEEK #7 SUBTOTALS & GROUP PRINTING
(SUBTOTALS, RANGE, CAMPARE VARIABLES, TOTALS)
H.W. p 183
Programming Assignment Group G

WEEK #8 WRITING PROGRAMS IN EASY-TO-UNDERSTAND MODULES
(MODULE, SUB MODULE, MAIN MODULE, FLAGS, GOSUB, RETURN)
H.W. p. 223 #1-4
p. 234 Debugging
Programming Assignment Group H

WEEK #9 USING CONTROLLED LOOPS
(NESTED LOOPS, FOR-TO-STEP, NEXT, WHILE, WEND)
H.W. p. 277 #1-4, Debugging
Programming Assignment Group I

WEEK #10 TABLES
(TABLES, ELEMENTS, SUBSCRIPT, ARRAY, DIMENSIONING, MENU, DIM, ON X GOTO)
H.W. p. 317-8 #1-6
p. 317 #1-33
Programming Assignment Group J

WEEK #11 SORTING
(SWAP, BUBBLE SORT, SCAN SORT)
H.W. p. 365-8 #1-3
Programing Assignment Group K

WEEK #12 ADVANCED HANDLING OF CHARACTER DATA
(GET, INKEY$, INPUT$, LEFT$, RIGHT$, MID$, ASC, LEN, CHR$, VAL, STR$, +)
H.W. p. 415-6 #1-6
Programming Assignment Group L

WEEK #13 SEQUENTIAL DATA FILES
(FILES, RECORD, FIELD, SEQUENTIAL, DISK)
H.W. none
Programming Assignment Group M

WEEK #14 RANDOM DATA FILES
(RANDOM DATA FILE, RECORD NUMBER, PUT, GET)
H.W. none
Programming Assignment Group N

WEEK #15 FINAL

GROUP A

1. Write a program that will print the following poster:

```
COMPUTER PROGRAMMING IS FUN!!
TRY IT-YOU MIGHT LIKE IT!!!!!
```

2. Write a program that will print the following:

```
                ARRL MEETING
MONDAY          APRIL 10
ROOM T300       4:00 PM
```

3. Write a program to print your name in block letters. A sample of how the output might appear is as follows:

```
   J    000  H   H  N    N
   J   0   0 H   H  NN   N
   J   0   0 HHHHHH  N N  N
J  J   0   0 H   H  N  N N
 JJ     000  H   H  N    N
```

4. Write and document a program that will calculate the net pay for an employee who worked 40 hours at 7.50 an hour. His deductions are 62.35. Display the results in the format below:

```
HOURS WORKED    XX
RATE            X.XX
DEDUCTIONS      XX.XX
NET PAY         XXX.XX
```

GROUP B

5. A report is needed to calculate the batting average of major league baseball players.
The output should follow the following format:

NAME	AT BATS	HITS	AVERAGE
JACKSON	45	23	.XXX
SMITH	52	40	.XXX
SAMSON	23	24	.XXX
WATERS	15	1	.XXX

Use data statements for all data, calculate the averages (average=hits/bats).

6. Generate the plots of the trig functions of sine, cosine, and tangent. Plot each in a different color for at least 360 degrees.

7. Write a program that will print the numbers 1 through 7 in a column and the squares and cube roots of these numbers in adjacent columns.

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GROUP C

8. Some data becomes easier to read if presented in graphical form. Write a program to produce the following graph:

```
                                    1   2   3   4   5
CAR                                 0   0   0   0   0
-------------------------------------------------------

GAZELLE                             XXXXXXXXX
MAVERICK                            XXXXXXXXXXXXXXXX
MOOSEMOBILE                         XXXXXXXXXXXXXXXXXXXXXXXX
WC3MOBILE                           XXX
-------------------------------------------------------
```

All data (car names and mileage) should be on data lines. (Note each X stands for 2 MPH).

9. Write a program to convert Fahrenheit temperature to Celsius. Place the data in a table. Start the table at -20 and end it at +300 degrees (F) in steps of 5. [(C=5/9*(F-32)] Place proper headings on your table.

10. Write a program to solve the following equation:

    Y=AX**3+BX**2+CX+D

    for values of A, B, C, & D as inputted from the keyboard.

11. Write a program to plot the following equation:

    Y=AX**3+BX**2+CX+D

    for values of A, B, C, & D as inputted from the keyboard.
    Choose your values to give three X-axis crossings.

12. Write a program that will find the area of a triangle given the base and the height. Use data statements to provide three sets of data.

13. Write a program that will print the variables and the results for C=(A**2+B**2)**0.5. Use the data as

    DATA 12,34,65,78,23,98,76,12

14. Write a program that will print fractional to decimal conversion tables for fractions from 1/16 to 1/2 in 1/16 increments.

15. Develop a program that inputs three colors representing the color code of a resistor and outputs the resistance value.

16. Create a plot of the voltage across a capacitor and the current flowing through it. Assume a 12 volt battery and R=1,000,000 C=1ufd. V = 12*(1-e1-T/R*C)

17. Develop a program that will find the true power and power factor for a load given its impedance (polar form). Assume that the source of electromotive force (EMF) is 120 Vrms at 60 hertz.

18. Write a program that will print the truth table of the Boolean expression

    F=A+B+C

    Your program should generate the binary bit pattern.

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GROUP D

19. Write a program to calculate your paycheck for 5 weeks. Your base pay is 7.50 per hour for the first 40 hours, 1.5 times your base pay for the next 20 hours, and 2.0 times your base pay for all hours over 60 per week. Deductions are 0% of your gross pay with a maximum of $50.00 a week. The total hours worked per week will be inputted through the keyboard. Complete the following table:

PAY SCHEDULE FOR (insert your name)

WEEK NO.	TOTAL HOURS	GROSS PAY PAY	DEDUCTIONS (THIS WEEK)	NET PAY
1	38			
2	40			
3	55			
4	65			
5	72			

20. Write a program for use by the state police in checking for stolen automobiles. Read the license numbers and description of the cars into matching tables from data statements.

    Input two options from the keyboard.

    a. input the license number, if the car has been stolen, print the description, if it has not been stolen, print the message 'not reported stolen'.
    b. request a list of all reported stolen cars.

21. Write a program to evaluate the compound interest equation A=P*(1+r)**n where:
    A is the accrued amount
    B is the invested principal
    r is the interest rate
    n is the number of years over which the principal is invested. The program should produce a table with four columns for interest rates between 10 and 13% and five rows for years 1 to 5. (Hint: Use a FOR NEXT loop to output one line at a time representing all the interest rates for a given year inside another loop that generates one line for each year).

22. Generate a table of angles (in degrees) from 1 to 90, SINE, COSINE, & TANGENT and print them in columns. Devise a method of handling the problem that arises in finding the tangent of 90 degrees.

23. Write a program that will print the numbers 1 through 10 in a column and the squares and cube roots of these numbers in adjacent columns. Round all numbers to 3 places, and all printing is to be right-justified.

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24. A daily absent report is to be provided for four departments. The department number and numbers of employees are to be stored in data statements, the number absent will be inputted from the keyboard. The percent absent will be calculated and printed in the fourth column as shown below:

DAILY ABSENCE REPORT FOR (current date)

DEPT	NUMBER OF STUDENTS	NUMBER ABSENT	PERCENT ABSENT
1324	45	5	XX.XX
6475	123	23	XX.XX
0007	4	0	XX.XX

25. Write a program that will convert miles per hour into kilometers per second. Input data from the keyboard. Test your program with the following data: 25 mph, 35 mph, 100 mph.

26. Write a program that accepts length and width dimensions for rectangular areas and computes the total area for all the dimensions entered. The program is to ask for more input until you enter the data 0.0. The number of areas and the total area should then be printed along with proper headings.

27. Write a program that will solve for two resistors connected in parallel. The equation is:

$$R = \frac{(R1)\ (R2)}{(R1) + (R2)}$$

The values for R1 and R2 are to be inputted from the keyboard.

GROUP F

28. It is usually accepted that maximum power is transferred from a power source to a load if the impedances of each are the same.

Assuming the power source has an internal resistance of 100 ohms, find the power used by the load. Use load resistor values of 2 ohms to 200 ohms in steps of 2 ohms.

Use this data to form a table and a graph and from this information, determine if the first statement is true.

29. Components are manufactured to some nominal value with a certain "make tolerance," the error range from the nominal value due to the precision limitations of the process. Often when the component values are measured, the units are categorized into groups having various tolerance ranges. Write a program that reads in the pairs of data below which represent the serial number of a component and the measured value of one of its parameters. The program should then establish the percent error from the nominal value of 40 and print the serial number followed by one of three tolerance ranges: 1%, 5%, or 10%.

SERIAL NUMBER	VALUE
100	41.4
101	37.3
102	39.8
103	43.6
104	39.2

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30. The basic charge for computer time is based on the number of hours of time used during a month. The schedule is as follows:

Hours Used	Basic Charge
0.00 to 5.00	$200
5.01 to 15.00	$200 plus $35 per hour for all time over 5 hours
15.01 and up	$550 plus $30 per hour for all time over 15 hours

In addition, there is a surcharge added to the basic charge depending on the priority used. The priority is indicated by a code. The surcharge is as follows:

Priority Code	Surcharge
0	0
1	$50
2	$150

Write a program that will accept a customer's account number, number of hours used, and priority code; calculates the total charge; and prints the account number charge. Use the following data to test the program:

Account No.	Hours Used	Priority Code
11825	3.52	0
14063	17.06	1
17185	7.93	1
19111	12.00	2
20045	5.00	1
21352	5.84	0
22841	27.94	2

31. A company agrees to pay one of its employees in grains of rice instead of money. The employee receives one grain on the first day, two grains on the second day, four grains on the third day, eight grains on the fourth day, and so forth. In other words, each succeeding day the employee receives twice as many grains as he or she did the day before. The employee works for the company for 20 days. Determine how much grain she receives each day.

GROUP H

32. Write a time delay program as a subroutine that has a delay of one second. Test your subroutine by calling it from a FOR NEXT loop 100 times. Your main program should print the message "start" and "finished" for timing purposes. Check the accuracy with a watch.

33. Write a menu driven program that contains several moduals. The menus are:

MAIN
1. ADDING PROGRAM
2. EQUATIONS
3. TRIG FUNCTIONS
4. MULTIPLY
5. End

ADDING MENU
1. ACCUMULATING TOTAL
2. Individual Total

MULTIPLY MENU
1. ACCUMULATING TOTAL
2. Individual Total

EQUATION
1. AX+B=
2. $AX^2+BX+C=$
3. Area of a square=

TRIG. FUNCTIONS.
1. Sin (x) =
2. Cos (x) =
3. Tan (x) =

All inputs are to be promoted from the keyboard.

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34. Write a program that will output the multiplication tables for up 5 x 5.

35. Using the one second subroutine, display a count down in the center of the screen, starting at 10 and each second decrement the count by one until it is zero, then print "IT IS DONE" in the middle of the screen.

36. Develop a program that finds the total resistance of a series-parallel circuit of arbitrary configuration. (HINT: Enter the number of resistors to be included. After entering the first resistance, input a code such as S for series and P for parallel prior to entering the next resistance. This will indicate how that resistor will be combined with the current value of the total resistance).

37. When flipping a coin, it is expected heads will come up as often as tails. This may be true if a large enough sampling is used. Write a program to test this. Use the RND function and total the number of heads and tails out of 100 flips. Then print the results as:

NUMBER OF HEADS=
NUMBER OF TAILS=

38. Given a series RC circuit connected to a battery of 10 volts, create a table of the voltage on the capacitor for 0 to 5 time constants in .1 increments.

39. Plot the equation:

y=3/4(x-10)**2+5

from the plot, determine the minimum value of y.

40. The equation v(t)=V(1-e**(-t/RC) describes the charging of a capicator. V, R, and C are constants and the instantaneous voltage v is a function of t. Use the values of R=2000, C=0.0001 f, V=100 for t of 0 to 1 second. Plot the curve.

41. A projectile is fired into the air with an initial vertical velocity of 1000 ft/sec. The equation of motion describing the vertical component of the trajectory is y=Vt-1/2at**2 where V-initial velocity and a is the acceleration of gravity (323.2 ft/sec/sec). Plot the function for t=0 to t=50 seconds. From the graph determine the maximum altitude attained by the projectile.

42. Plot the following equation:

y=100e**(-t)*cos(6t+3.14159)

43. Assume that a pair of rabbits can produce a new pair in one month's time. Each pair becomes fertile at one month of age and begins the cycle of reproducing a new pair every month. If rabbits never die, how many pairs of rabbits are produced from a single pair in N month's time?
If N ranges from 1 to some maximum value, the solution to this problem creates a sequence of numbers known as the Fibonacci sequence after the Italian mathematician who first posed the problem. For and N greater than 2, the value in the sequence is the sum of the two previous values. Thus: the sequence is as follows:

Month	Number	Month	NUMBER
1	1	6	8
2	1	7	13
3	2	8	.
4	3	.	.
5	5	.	.

Write a program to compute and print a table of the number of rabbits produced from the original pair at the end of month N.

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GROUP J

44. Write a program that will allow a teacher to key in up to 35 student names and test scores. The names and scores should then be sorted in descending sequence and printed. The average of all test scores is to be printed at the bottom of the list.

45. The equation for resonance of an LC series circuit is well known. Develop the impedance of a series LCR circuit for values of L C and R. Write a program that will plot the Z verse F for your equations. Choose reasonable values for L & C. Start with R=0 then replot using other values for R. (You will notice the bandwidth and amplitude will change).

46. The following equations are developed from a two-loop electric circuit. Write a program that will solve for the unknown values:

$$ax+by=c$$

$$dx+ey=f$$

$$x=\frac{ce-bf}{ae-bd}$$

$$af-cd$$

$$y=\frac{\qquad}{ae-bd}$$

Use the 4 sets of values listed below to test your program.

A	B	C	D	E	F
1	2	4	6	8	12
-4	-6	12	54	13	7
5	3	15	76	12	-9
1	2	34	4	8	0

47. Plot the following function:

$$x^{**}3-23x^{**}2+160x-336$$

from the graph, determine the number of zero crossings and where they occur.

48. Write a program that will draw a 20 tooth gear on the screen.

49. Write a program that will (1) plot the equation y=100-(x-10)**2 between the limits of 0 and 20. (2) then find the area under the curve.

50. Write a program to print a graph of both the equations y=2x+3 and y=-3x+13. Use different symbols for each line and a special symbol for the point of intersection.

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GROUP J (continued)

51. Each student in a class of fifteen took two examinations. A program is needed to calculate the total and average test score for each student, the total and average for the entire class on each test, and the total and average of all thirty test scores. Input to the program is each student's identification number and score on each of the two tests. Output should list the input data and all required totals and averages. Supply headings and other descriptive information to identify the output. Put the following data in data statements and use it to test the program.

Identification Number	First Test Scores	Second Test Scores
101	88	73
102	100	92
103	45	78
104	63	69
105	84	87
106	92	88
107	91	100
108	61	75
109	78	73
110	99	94
111	74	82
112	83	69
113	100	100
114	52	69
115	85	85

Notice that the data does not include a trailer value. The program should use a FOR loop to process exactly fifteen sets of input data.

52. An airline flies between six cities. Whether or not there is a direct flight from one city to another is indicated in the following tables:

		TO:					
		1	2	3	4	5	6
	1	N	Y	Y	N	N	Y
	2	Y	N	Y	N	N	Y
	3	N	N	N	Y	N	N
FROM:	4	N	Y	N	N	Y	N
	5	N	Y	N	Y	N	N
	6	N	Y	N	N	Y	N

On the left and across the top are the numbers of the cities. If there is a Y at the intersection of a row and a column, there is a direct flight from the city marked on the left to the city indicated at the top. A N indicates that there is no direct flight between the two cities. This table can be used to determine whether a flight pattern is possible. A flight pattern consists of five digits indicating the cities between which the customer wishes to fly. For example, the pattern 1,3,4,2,6 indicates that the customer wishes to fly from city 1 to city 3, then from city 3 to city 4, then to city 2, and finally to city 6. If the customer has fewer than five cities in his or her flight pattern, the remaining digits are zeros. Thus, a pattern of 6,2,0,0,0 indicates that the customer wishes to fly from city 6 to city 2 and not wish to continue beyond that.

GROUP J (continued)

52.(continued) Write a basic program to read the data for the flight table from DATA statements. Then print the table with appropriate headings. Next, accept from the terminal a customer number and a requested flight pattern. Determine whether the flight pattern is possible. Print the customer's number, his or her requested flight pattern, and a statement as to whether a ticket may be issued for the desired pattern. Use the following input data to test the program.

Customer Number	Flight Pattern
10123	1,3,4,2,6
11305	6,2,0,0,0
13427	4,2,3,2,0
18211	5,2,5,0,0
19006	3,4,2,1,2
20831	6,5,4,2,6
21475	3,2,0,0,0
22138	4,3,6,2,1
24105	1,3,4,2,4
24216	6,5,2,3,1
25009	3,4,2,5,0
00000 (trailer value)	

53. A telephone company charges varying rates for a long-distance call between two cities. The rate charged depends on the time of day the call is made and how the call is placed. There is a fixed charge for the first three minutes and a charge for each additional minute or fraction thereof. The following table outlines the rate structure:

How Placed	Day	Evening	Night	Weekend
	.79	.58	.52	.49
direct-dial	.26	.23	.21	.15
operator aid	.95	.73	.64	.57
	.30	.25	.24	.21
person-to-person	1.55	1.55	1.55	1.55
	.52	.52	.52	.52

For any given time of day and method of placing the call, two figures are shown. The top figure represents the charge for the first three minutes or fraction thereof; the bottom figure represents the charge for each additional minute or fraction thereof. For example, a night call that is station-to-station, operator-assisted is charged $.64 for the first three minutes, and $.24 for each additional minute.

Write a basic program to read and print the rate table using two two-dimensional arrays. One array should be used for the charges for the first three minutes and the other array for the charges for each additional minute. Then accept from the terminal a customer's number, a "how placed" code (1 for direct-dialed, 2 for station-to-station, 3 for person-to-person), a "time of call" code (1 for day, 2 for evening, 3 for night, and 4 for weekend), and length of call. From this information determine the charge for the customer. Print the customer's number, the length of the call, and the charge.

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GROUP J (continued)

53. (continued) To test the program, use the data in the preceding rate table and the following customer data:

Customer Number	How Placed	Time of Call	Length
9606	1	1	3.84
2160	3	4	2.50
6100	2	2	3.00
1820	3	3	4.00
9215	2	1	8.50
2111	1	3	6.32
1452	2	3	2.15
6658	1	2	1.05
1138	3	2	9.72
6886	2	4	6.35
3552	3	1	3.51
7111	1	4	5.75
9999 (trailer value)			

GROUP K

54. In a particular school, all students who entered before 1982 must have 375 hours of credit to graduate. All those entering in 1982 or later must have 390 hours to graduate. The following student number is alphanumeric and contains the following information:

Digit	Meaning
1-2	year entered
3	M-male, F-female
4	F-full time, P-part time student
5-7	sequential number
8-18	students last name

Enter ten student numbers (and names) using data statements, provide a menu driven list for the following options:

List all students (by name)

1. That enrolled before 1982
2. That enrolled in 1982 or after
3. All male students
4. All female students
5. All part time students
6. All full time students
7. All part time female students

Take the last list and sort it by:

8. Alphabetically
9. Ascending student number
10. Descending student number

Some sample student information data statements are:

```
10 DATA 82FF321SMITH
20 DATA 83MF007JONES
```

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GROUP K (continued)

55. From data tables, load an array with the following data:
DATA 1000,1200,1000,1001,100,900,470,480,12000,12100
If each resistor was coded as 1000 or 475, sort the list and fill in the following table:

RESISTOR SAMPLING NUMBER 4

VALUE	NO. OF PIECES	NO. WITHIN 10%	NO. OUT OF 10%
1000	XXXX	XXXX	XXXX
470	XXXX	XXXX	XXXX
TOTALS	XXXX	XXXX	XXXX

56. Write a program that will do a two column sort.

ITEM	PART NO.
WASHER	3142
ROD	5386
BRACKET	6309
BOLT	4678
DOOR	9000
SEAT	1094

You will be printing 3 lists as follows:
1. raw data (as listed above)
2. alphabetically by item name
3. descending part number
For each list, print both columns.

57. Write a basic program to read a list of 20 names from data statements. Then sort the names into alphabetical order and print the sorted list. Use the following list of names. These must be read in the order given (not resorted):

DATA LIST:
KIDD OU
PLENTY B O
GOODFELLOW B O
ANSWER WILLIE
MOORE LUVERAU
FIRST HUGO
BETTA SEYMOUR
TURNER PAGE
LANE LOIS
FROM GLAD MANN
READY R U
DOKE O K
JONES K C
LEAF LETUS
OHATA TOM
RICK GRAINA
STINK PU
UKAH SHIRLEY
YOUNG URSEA
BEAUTIFUL U R

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of use is in drawing schmatics on the CRT. The procedure is to create a component graphic cell for each circuit element. (i.e., a vertical resistor, a horizontal resistor, vertical line, horizontal line, etc). These cells then can be duplicated anywhere on the screen the designer wishes. Design the graphic cells as subroutines for the logic gates of AND, OR, INVERTER, and horizontal and vertical lines for interconnections. The main program must then set the screen location and the logic call to be displayed.
If you have the time, modify the main program to allow keyboard input with cursor control for the design. GOOD LUCK WITH THIS ONE!!!!

59. The following data statements contain a list of part numbers. Write a program that reads the data and prints all part numbers that start with the letters SN.
110 DATA SN7400,MOC3011,TI9944,SN7476,2N222,MC1488
110 DATA SN74135,ADC0809

60. Write a program that reads the names in the data statements below and print them last name first.
100 DATA JOHN SMITH,MARYJONES,HARRYT WILLIAMS,BERT PARKS
110 DATA ALICE MCBRIDE,BLAISE PASCAL

61. Write a program that accepts a sentence from the keyboard. It should then analyze the sentence to determine the number of words and the average length of all the words. (The number of words equals the number of spaces plus 1).

62. The phone book is a useful item that can be put on a computer. Each entry consists of a name (last first), an address (number and street), and the phone number. Sometimes we need the name, or we have the address and need the name and number.
Set up a data disk file that contains the phone book entry (20 names). Offer a menu that allows the operator to locate the proper record in your file from just the name, from just the number, and from just the address. The entire record must be printed.

63. In a political survey a number of people were given six statements about a political candidate's involvement in illicit campaign practices. Each person was asked to indicate whether he or she felt each statement was true or false by writing a T or F. A basic program is needed to analyze these data. The program should determine the answers to the following questions:
    (a) What percentage of the people in the survey felt that the first two statements were true and the remainder false?
    (b) What percent felt that all six statements were true?
    (c) What percent felt that all six were false?

Output should give the answers to these questions with appropriate descriptive headings. Input data consists of the six responses for each person. Use the following data to test the program.

<u>Survey Responses</u>

TFTTTT	TTFTFT
TTTTTT	TTFTTT
TTTTTT	TTTTTT
FFTTTT	FFTTTT
TTTFTT	FTFTFT
FTTTTT	TTFTTT
FTTTTT	TFFTTT
TTTTTT	TTTTTT
FTTTTT	FTFTFT

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64. A five-question true-false test needs to be graded. The correct answers are entered on the first line. On each succeeding line is entered a student's number and his or her answers to the five questions. Write a basic program to determine the number of correct answers for each student. The output for this program should give the correct answers followed by each student's number, his or her answers, and the number of correct answers. Use the following data to test the program.

Correct Answer=FTTFT

Student's No.	Student's Answer
101	FTFFT
102	TTTFF
103	TFFTF
104	FTTFT
105	TFTFT
106	FTTTT
107	FTFTF
108	TFFTF
109	FTTFT
999 (trailer value)	

65. Write a basic program to count the number of times that the word THE occurs in a lie of test. Asume that the line contains only alphabetic characters and blanks. Use the following lines to test the program:

The man wondered whether the theater was there
Then the man thought that it was here
But it was not there
The the the tithe the the the

GROUP M

66. Write a basic program to create a file on disk of test-score data. Each record in the file has two fields—an identification number field and a test score field. The records in the file are not in any particular order. Store the following data in the file:

Id. No.	Score	Id.No.	Score	Id.No.	Score
282	99	282	83	240	73
115	75	116	72	145	74
124	76	123	71	267	74
215	77	114	74	294	91
208	78	201	79	206	75
275	69	287	96	232	75
225	85	242	71	150	76
113	77	119	63	133	83
205	76	142	78	255	70
122	89	219	84	250	77
137	78	248	72	210	70
185	75	173	79	233	80
235	100	261	85	166	71
138	75	265	71	202	61
298	74	281	72	176	81
217	62	139	55	257	72
104	82	141	73	256	14

Write a basic program to read the data from the disk and print the data.
Write a basic program to process the data in the test score file as follows:

a. Accumulate and print the total of the test scores.
b. Calculate and print the mean of the scores.
c. Determine and print the number of scores that fall into each of the following categories:

90–100
80– 89
70– 79
60– 69

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GROUP N

67. Create a random disk file containing 10 typical test questions with answers. Use one disk record for each question/answer.
The program then is to ask "What question?" and wait for an answer of 1-10. Retrieve the proper disk record and print it. An input of 0 will terminate the program. Check the question numbers for proper range and print an error message if it is out of range.

68. Generate 20 math problems and store one each as a random data file on disk. The program should prompt the user for a problem number, retrieve it from disk and list it.

GROUP O

69. At times it is necessary to plot two or more curves on the same axis. Write a plotting routine that will use the symbol '+' for one curve, and '*' for the second curve. Test your program with the following data.
Curve #1 sin (x)
Curve #2 cos (x)

70. HAVE THE INSTRUCTOR CONNECT THE I/O BOARD.
Write a program that will make the lights flash on and off if switch 1 is on, flash in sequency if switch 2 is on, and lights 2,4,6,8 on then 1,3,5,7 on then off and repeat if switch 3 is on.

CJI WORK DISK
DOCMT #3

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NEW COURSE

ADMINISTRATIVE REVIEW FORM

*Course Title: COMPUTER SERVICE AND REPAIR (COMPS 145)

*Implamentation Date: FALL 1986

*Rationale for the Course/Program: This course will give the student the knowledge to repair computer main boards. It is a required course for the Computer Service Technician Program.

*Number of Seats Needed: 24

Project Enrollment:

	Fall	Winter	Spring	Summer
*1st year	24	24	-0-	-0-
*2nd year	48	48	-0-	-0-

*Transferability:

College or University	Approval Date
L.I.T. - Contact Dr. Dick Michal	2+2 Program under development
WAYNE - Contact Dr. Stocker	5/30/85 for 2+2
FERRIS - Contact Dr. Frank Sager	5/30/85 for 2+2

Faculty Competance:

*Degree: MSEE, or three years computer service experience.

*Experience: Two years digital servicing experience.

*Applicable Prof. Development/Cont. Educ.: Zenith Computer Service School

*Name: Jerry Wala — IBM-PC Computer Service School

Total Expenses:	1st year	2nd year	3rd year
*Expense Faculty	$ 4,420	$ 8,840	$ 8,840
*Supplies	500	1,000	1,000
Administrative	1,200	1,800	2,100
Total	$ 6,120	$ 11,640	$11,940

Total Income:	1st year	2nd year	3rd year
*Tuition	$ 6,552	$ 13,104	$ 13,104
*Lab Fee	240	480	480
State Aid	7,207	14,414	14,414
Total	13,999	27,998	27,998

Relationship to Master Plan: This course is required for the new Computer Service Technician Program. The program is a part of the college's five year plan.

*To be filled in by person submitting course

SCHOOLCRAFT COLLEGE

Course Description Form:

Prepared by:

J. Wale Date 5/23/85

Date

Date

Reviewed by:

Date

Date

Date

Date

Date

DEPT. COURSE NO: COMPS 145

COURSE TITLE: Computer Service and Repair

Lec. Hrs. 2 Lab. Hrs. 4 (Split lab 4-4) Credit Hrs. 4

CATALOG DESCRIPTION: (Indicate in paragraph form what will be taught in the course. Include prerequisites for the course.)

4 Credit Hours

Students will learn to diagnosis problems and repair to component level, the typical malfunction of a personal computer. We will use educational demonstration models to begin with and then progress to the commercial Zenith Z-100 Models as a typical P.C. Students will also perform diagnosis and repair on selected models of IBM, Radio Shack and Apple computers as they are available.

PREREQUISITE: Elect 223

COURSE OBJECTIVES: (Begin each course objective with "the student will be able to . . . ".)

THE STUDENT WILL BE ABLE TO:

1. Explain the functional blocks of an IBM-PC, Apple, TRS-80 or Z-100 computers.
2. Explain and trace major signals in typical computer power supplies.
3. Explain and trace the major signals around the CPU.

4. Explain and trace major support circuitry.

5. Understand RAM, ROM, AND I/O Interfacing.

6. Use some of the available software debugging/troubleshooting tools.

Course Description Form (continued)

COURSE CONTENT/OUTLINE: (Write the major topics for the course. Under each topic include the units.)

UNIT #1 COMPUTER (P.C.) SYSTEM
FUNCTIONAL BLOCKS

UNIT #2 POWER SUPPLIES
CONDITIONING, FILTERING, COMMON TYPES

UNIT #3 CPU
ARCHITECTURE

UNIT #4 SUPPORT CIRCUITRY
RESET, TIMING, CLOCK

UNIT #5 MEMORY
TYPES CHARACTERISTICS, R/W, ROM

UNIT #6 I/O INTERFACING

UNIT #7 SOFTWARE DEBUGGING TOOLS
DEBUGGERS AND THEIR USES

Course Description Form (continued)

METHOD OF EVALUATION: (Indicate how the competencies achieved will be translated into the grading system.)

Typically seven (7) tests will be given and the lowest score dropped. Lab reports and a project are required for a student to receive a passing grade.

TESTS	40%
REPORTS	40%
PROJECTS	20%

AA	90-100
BB	80-89
CC	70-79
DD	60-69
F	0-59

COURSE SYLLABUS: (This should be a companion document distributed to the students on the first day of class. It should include the Instructional Goals, Performance objectives and specific method of evaluation.)

SYLLABUS
Computer Service Technician Program
Computer Service and Repair
Course COMPS 145

Course Aims and Objectives:

The main objective of this course is to organize the students knowledge of digital electronics and computers and apply this knowledge to the understanding of a micro-computer system. Each of the major functional units of a personal computer will be covered. Examples of practical circuits will be used and analyzed. The personal computers of primary interest will be the IBM-PC, Apple IIe, and the Zenith Z-100.

Methods of Grading and Examinations:

Typically seven (7) tests will be given and the lowest score dropped. Lab reports and a project are also required for a student to receive a passing grade.

TESTS	40%
REPORTS	40%
PROJECT	20%

A 90-100

B 80-89

C 70-79

D 60-69

F 0-59

Text:

COMPUTER SERVICING EB-2001 Heathkit/Zenith

STUDENT WORKBOOK EB-2001-40 Heathkit/Zenith

Supplemental Information:

Z-100 Service Manuals
Apple Service Manuals
IBM-PC Service Manuals

WEEK #1	INTRODUCTION DEFINE TERMS FUNCTION BLOCK DIAGRAM REVIEW STUDENTS BACKGROUND PC HARDWARE
WEEK #2-3	POWER SUPPLIES TYPES (IC,SWITCHING, REGULATED, PROTECTION, NON-REGULATED % RIPPLE, BATTERY BACK-UP)
WEEK #4-5	CENTRAL PROCESSING UNIT (8088) ARCHITECTURE (DATE REGISTERS, PROGRAM CONTROL, ALU) BUS (DATA, ADDRESS, CONTROL) Buffering
WEEK #6-7	MICROPROCESSOR TIMING READ/WRITE TIMING SET UP AND HOLD TIMES ACCESS TIMES DATA
WEEK #8-9	SUPPORTING CIRCUITRY RESET, POWER-ON RESET TIMING CIRCUIT (CRYSTAL CONTROLLED) TIMERS DATA DECODERS, BUFFERS
WEEK #10-11	MEMORY ROMS, RAMS, EPROMS, DECODING, TIMING, STATIC & DYNAMIC, CIRCUITS USED LATCHING & BUFFERING, BANK SELECT LOCAL vs.GLOBLE
WEEK #12-13	I/O INTERFACING MEMORY MAPPED I/O PORTS INTERFACE CHIPS PLA, P10 ADDRESSING & CONTROLS UARTS SYNCHRONOUS vs. ASYNCHRONOUS HAND SHAKING
WEEK #14-15	SOFTWARE DEBUGGING TOOLS RAM CHECK, ROM CHECK PARITY, CRC SOFTWARE DRIVERS FOR I/O & PERIPHERAL DEVICES

BEST COPY AVAILABLE

NEW COURSE

ADMINISTRATIVE REVIEW FORM

*Course Title: COMPUTER PERIPHERAL SERVICE AND REPAIR (COMPS 245)

*Implementation Date: WINTER 1987

*Rationale for the Course/Program: This course will give the student the knowledge to repair and adjust selected computer peripherals. It is a required course for the Computer Service Technician Program.

*Number of Seats Needed: 24

Project Enrollment:

	Fall	Winter	Spring	Summer
*1st year	-0-	24	-0-	-0-
*2nd year	24	24	-0-	-0-

*Transferability:

College or University	Approval Date
L.I.T. - Contact Dr. Dick Michel	2+2 Program under development
WAYNE - Contact Dr. Stocker	5/30/85 for 2+2 Program
FERRIS - Contact Dr. Frank Sager	5/30/85 for 2+2 Program

Faculty Competance:

*Degree: MSEE or three years computer service experience

*Experience: Two years digital related servicing experience

*Applicable Prof. Development/Cont. Educ.: Heath/Zenith School
IBM-PC School

*Name: Jerry Wale

Total Expenses:	1st year	2nd year	3rd year
*Expense Faculty	$ 2,210	$4,420	$4,420
*Supplies	500	1,000	1,000
Administrative	1,200	1,800	2,100
Total	$ 3,910	$7,220	$7,520

Total Income:	1st year	2nd year	3rd year
*Tuition	$ 3,276	$ 6,552	$ 9,828
*Lab Fee	120	240	360
State Aid	3,603	7,207	10,810
Total	$ 7,000	$ 14,000	$ 20,998

Relationship to Master Plan: This course is required for the new Computer Service Technician Program.

The Computer Service Technician Program is a part of the college's five year plan.

*To be filled in by person submitting course

SCHOOLCRAFT COLLEGE

Course Description Form:

Prepared by:

J. Wale Date 5/23/85

_____ Date_____

_____ Date_____

Reviewed by:

_____ Date_____

_____ Date_____

_____ Date_____

_____ Date_____

_____ Date_____

DEPT. COURSE NO: COMPS 245

COURSE TITLE: COMPUTER PERIPHERAL SERVICE AND REPAIR

Lec. Hrs. 2 Lab. Hrs. 4 (Split lab 4-4) Credit Hrs. 4

CATALOG DESCRIPTION: (Indicate in paragraph form what will be taught in the course. Include prerequisites for the course.)

4 Credit Hours.

Students will learn to diagnosis problems and repair to the component level. The typical malfunction in computer modems, disk drives, printers, cpu, and interconnecting cabling and interfacing devices. We will use educational demonstration models as a starting point and progress to commercial units of Zenith, IBM, Radio Schack and Apple, ect.

PREREQUISITE: COMPS 145

COURSE OBJECTIVES: (Begin each course objective with "the student will be able to . . . ".)

THE STUDENT WILL BE ABLE TO:

1. Explain and trace Serial, Parallel, and some Non-Standard communication interfaces, and Cabling.
2. Test and trouble shoot keyboards and its interfacing circuits.
3. Test and repair CRTS.

4. Explain Raster Scanning, Interlace and Non-interlace Scanning.

5. Explain the operation of a Dot-Matrix Printer and test it for proper operation.

6. Perform preventative maintenance on disk drives and printers.

7. Align and adjust disk drives.

8. Explain and trace the major functional blocks of Modems.

Course Description Form (continued)

COURSE CONTENT/OUTLINE: (Write the major topics for the course. Under each topic include the units.)

UNIT #1 COMMUNICATION STANDARDS
SERIAL, PARALLEL, EIA STANDARDS

UNIT #2 INPUT DEVICES
KEYBOARDS, OPTICAL READERS

UNIT #3 VISUAL DISPLAYS
CRT, COLOR, OTHERS

UNIT #4 PRINTERS AND PLOTTERS
DOT MATRIX, DAISY WHEEL

UNIT #5 MASS STORAGE DEVICES
TAPE, DISK, SOLID STATE

UNIT #6 DATA TRANSMISSION
MODEMS, DATA LINES, STANDARDS

Course Description Form (continued)

METHOD OF EVALUATION: (Indicate how the competencies achieved will be translated into the grading system.)

Typically 7 (seven) tests will be given and the lowest score dropped. Lab reports and a project are also required for the student to receive a passing grade.

TESTS	40%
REPORTS	40%
PROJECTS	20%

A	90-100
B	80-89
C	70-79
D	60-69
F	0-59

COURSE SYLLABUS: (This should be a companion document distributed to the students on the first day of class. It should include the Instructional Goals, Performance objectives and specific method of evaluation.)

SYLLABUS
Computer Service Technician Program
Computer Peripheral Service & Repair
Course COMPS 245

Course Aims and Objectives:

The main objective of this course is to give the student exposure to common computer peripherals. These include CRT'S, printers, Modems, and disk drives. Principles, operations, preventative maintenance (P.M.), and circuits will be discussed. The depth of circuit analysis will depend upon the student background.

Methods of Grading and Examination:

Typically seven (7) tests will be given and the lowest score dropped. Lab reports and a project are also required for the student to receive a passing grade.

TESTS	40%
REPORTS	40%
PROJECTS	20%

A 90-100

B 80-89

C 70-79

D 60-69

F 0-59

Text:

Computer Servicing - Peripherals
EB-2002 Heathkit/Zenith

Workbook - EB-2002-40 Heathkit/Zenith

Supplemental Information:

Service Manuals
Data Sheets

WEEK #1	INTRODUCTION COMMUNICATION STANDARDS Serial (RS232C, RS422) Parallel (IEEE 488) Non-standard (Current loop, Centronics)
WEEK #2	CONTINUED CODES Switch (HALL, CAPACITIVE, REED, MATRIX, ENCODED)
WEEK # 3-5	VISUAL OUTPUT DISPLAYS VIDEO (RASTER SCAN, CHARACTER GENERATION, REFRESH, VIDEO CURSER) Graphics, BIT Mapped RGB vs. VIDEO COMPOSITE Video Circuits
WEEK # 6-8	PRINTERS DOT-MATRIX (Head motion & Decoding) Strike-on printers
WEEK #9-12	DISK DRIVES P.M. Theory Circuits
WEEK #13	DATA TRANSMISSION STANDARDS EIA ANSI IEEE INTRODUCTION TO NETWORKS
WEEK #14	MODEMS BLOCK DIAGRAM & CIRCUIT ANALYSIS
WEEK #15	FINAL

NEW COURSE

ADMINISTRATIVE REVIEW FORM

*Course Title: CIRCUIT ANALYSIS AND REPAIR INTERNSHIP

*Implementation Date: WINTER 1987

*Rationale for the Course/Program: This internship will give the student practical experience working in a servicing department. It is a required course for the new Computer Service Technician Program.

*Number of Seats Needed: 24

Project Enrollment:

	Fall	Winter	Spring	Summer
*1st year	-0-	24	-0-	-0-
*2nd year	24	24	-0-	-0-

*Transferability:

College or University	Approval Date
L.I.T. - Contact Dr. Dick Michel	2+2 Program under development
WAYNE - Contact Dr. Stocker	5/30/85 for 2+2 program
FERRIS - Contact Dr. Frank Sager	5/30/85 for 2+2 program

Faculty Competance:

*Degree: MSEE or three years computer service experience.

*Experience: Two years digital related servicing experience.

*Applicable Prof. Development/Cont. Educ.:

*Name: Jerry Wale

Total Expenses:	1st year	2nd year	3rd year
*Expense Faculty	$ 2,526	$ 5,052	$ 5,052
*Supplies	100	200	300
Administrative	1,200	1,800	2,100
Total	$ 3,826	$ 7,052	$ 7,452

Total Income:	1st year	2nd year	3rd year
*Tuition	$4914	$9828	$14,742
*Lab Fee	0	0	0
State Aid	5405	10,810	16,216
Total	$10,319	$20,638	$30,958

Relationship to Master Plan: This internship is required for the new Computer Service Technician Program.

The college 5 year plan includes the new program.

*To be filled in by person submitting course

SCHOOLCRAFT COLLEGE

Course Description Form:

Prepared by:

J. Wale Date 9/4/85

Date

Date

Reviewed by:

Date

Date

Date

Date

Date

DEPT. COURSE NO: COMPS 265

COURSE TITLE: CIRCUIT ANALYSIS AND REPAIR INTERNSHIP

Lec. Hrs. 4 Lab. Hrs. 4 Credit Hrs. 6

CATALOG DESCRIPTION: (Indicate in paragraph form what will be taught in the course. Include prerequisites for the course.)

Six (6) Credit Hours.

Students will be assigned to a college computer laboratory as an "on call" intern to maintain all models of computers and computer peripherals. They will also perform periodic prevention maintenance on in structional computers and keep records on each. Class room time will be used to analyze common circuits the students are servicing during the "on call" section of the course.

CO-REQUISITE: COMPS 245

COURSE OBJECTIVES: (Begin each course objective with "the student will be able to . . . ".)

THE STUDENT WILL:

1. Spend 4 hours a week (MIN.) working on computer equipment, peripherals and cabling.
2. Gain experience in the testing and servicing of personal computers and peripheral equipment.

3. Perform preventative maintenance on disk drives and printers.
4. Aid in the installation of new equipment as directed.
5. Maintain a log of all internship activities.
6. Prepare reports on the servicing jobs performed for class discussions.

Course Description Form (continued)

COURSE CONTENT/OUTLINE: (Write the major topics for the course. Under each topic include the units.)

The main objective of this internship is to give the student experience in the real world of computer servicing. This can not be accomplished in the classroom. The student will be working under the supervision of computer service personnel in a service department. Expected duties will include P.M., Disk Drive Repair, Computer (P. C.) Repair, Printer Adjustment, P.M. & Repairs, the Fabrication, Repair and Installation of Cabling and any other duties a computer service person would be expected to perform. Actual circuits being repaired will be discussed during the classroom time.

Course Description Form (continued)

METHOD OF EVALUATION: (Indicate how the competencies achieved will be translated into the grading system.)

Typical employee evaluation techniques will be used in formation of the students grade, as listed below. A failure in any one area will result in the failure of the student.

Log Book	20%
Supervisor Evaluation	30%
Work Performed	10%
Attendance	10%
Coordination Evaluation	30%

COURSE SYLLABUS: (This should be a companion document distributed to the students on the first day of class. It should include the Instructional Goals, Performance objectives and specific method of evaluation.)

SYLLABUS
CIRCUIT ANALYSIS AND REPAIR INTERNSHIP
COMPUTER SERVICE TECHNICIAN PROGRAM
COMPS 265

6 Credit Hours, 15 Weeks, 4 Hours Lecture, 4 Hours "ON Call"

CC-REQUISITE: COMPS 245

Course Aims and Objectives:

The main objective of this internship is to give the student experience in the real world of computer servicing. This can not be accomplished in the classroom.

The student will be working under the supervision of computer service personnel in a service department. Expected duties will include: P.M. (Preventitive Maintenance), disk drive repair, computer repair (IBM-PC, APPLE, RADIO SHACK, ZENITH Z-100), printer adjustment, P.M. and repair, the fabrication, repair and installation of cabling and any other duties a computer service person would be expected to perform. Four hours a week will be used for class discussion of servicing circuits and problems encountered during the internship.

Method of Grading:

The student's grade will be a composite of the Internship Supervisors Evaluation, the student's log book, and the coordinator evaluation. A failure in any of the areas will result in a failing grade.

30% INTERNSHIP SUPERVISOR'S EVALUATION
A sample form is attached.

20% STUDENT'S LOG BOOK
In addition to any paperwork, reports, or forms required, the student will maintain a daily personal log book. This log will be evaluated by the coordinator at the end of the term.
A sample log entry is attached.

30% COORDINATOR'S EVALUATION
The coordinator may interview the student, supervisor, other internship students, or anyone that the student has been in contact with during the internship assignment.

10% WORK PERFORMED

10% ATTENDANCE

Assignments:

First Meeting
A. Introduction
B. Assign scheduled times (4 hours/week)
C. Explain "on call" time

Assignments Continued:

D. Describe the forms:
    1. Evaluation forms (each item)
    2. Log Book
    3. Contract
E. Students responsibilities
F. Training site responsibilities
G. Introduction to the training supervisor
H. Tour of the facilities and computer labs
I. Explain classroom time activities

Student's Responsibilities:

1. 4 hour/week period of assigned duties or
2. 4 hour/week of "on call" as needed.
3. Maintain a daily personal log book.
4. Disk drive P.M.
5. Printer P.M.
6. Servicing of equipment as needed.
7. Installation ad check out of new equipment.
8. Modivy current installation as needed.
9. Maintain service reports on computer data base.
10. Any other documentation as needed.
11. Perform related repair/installation of computer controlled equipment.
12. Organizing/maintaining stock room inventory.
13. Specifying/ordering parts as needed.
14. Attend 4 hours of classroom discussion/circuit analysis per week.

COMPS 265
LOG BOOK

The purpose of your personal daily log book is to provide a running summation of your work activities and experiences.

It will be used as a major determining factor in the grade given for your internship, but it can also be useful in preparing your resume.

The log book can take many forms, however, some information will be common to all entries.

1. Date
2. Equipment name, model number, (or other identification information)
3. Location of equipment
4. Nature of the job, (repair, move, installation, teach, set up, etc.)
5. If a repair, nature of the complaint
6. Person who gave you the assignment
7. Person who gave you the OK when job was finished
8. Time you started
9. Time you finished
10. Elapsed time
11. Description of what you did
12. Any parts used
13. Any parts ordered
14. Any other information such as pin outs of connections, wire length and gage (if making cables), wire routing through the room (if the job was installed), or any particular difficulties encountered.

SAMPLE ENTRY
LOG BOOK

DATE: 6/12/88

START: 10:55 a.m.

END: 2:41 p.m. TOTAL TIME: 3:46

EQUIPMENT: TRS - 80 Model 3 Serial Number 123456

LOCATION: T-500

COMPLAINT: No response from the keyboard, computer appears to load OK from disk.

CONTACT: Jeff Putman

REPAIR: OKed by Linda Smith

PROBLEM: 1. Loose kayboard connector
2. Brokan trace on keyboard

COMPS 205

INTERNSHIP SCHEDULE

NAME_____ DATE_____

	MON	TUE	WED	THR	FRI	SAT
7						
8						
9						
10						
11						
12						
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

INSTRUCTIONS:

1. Insert class number and room number for all classes you are currently taking.
2. Add your four hours of internship assigned time.
3. Place "NO" on all hours when you CAN NOT answer a call.
4. Place "YES" on all prefered on call hours (10 minimum).

SCHOOLCRAFT COLLEGE
18600 Haggerty Road
Livonia, MI 48152

AND

_____ _____
Employer's Name Supervisor

_____ Phone_____
Address City State Zip

Join in this Cooperative Occupational Training for:

Trainee_____ Position_____

Address_____ Phone_____
City State Zip

Student No._____ Semester: Fall___ Winter___ Spring___ 19____

JOB ACTIVITIES_____

_____

_____

The above trainee's program and conditions of employment are satisfactory to all parties. All parties assume responsibility for training under the following conditions.

The Employer
1. agrees to provide bona fide training in the occupation in accordance with the terms agreed upon.
2. agrees that the employment of the trainee shall conform to all Federal and State laws and regulations.
3. submits evaluation reports on the student named above.

The Coordinator
1. will assume the responsibility of obtaining evaluation reports from the employer.
2. agrees to maintain necessary records.
3. meets with the students periodically.

The Trainee
1. shall diligently and faithfully perform the work and duties of the job and abide by the plan of training.
2. maintain a log book on all activities.
3. shall receive college credit for COMPS 265 (Computer Service and Repair Internship) on successful completion.
4. agrees to be present for eight assigned hours and four "on-call" hours per week.

*Employer_____ Date_____

Coordinator_____ Date_____

Trainee_____ Date_____

*Please sign both copies of this training agreement and return the original to the Cooperative Training Coordinator.

SCHOOLCRAFT COLLEGE
COMPUTER SERVICE TECHNICIAN
COOPERATIVE INTERNSHIP
STUDENT RATING FORM
COMPS 265

Semester_____

Mid-Term or Final

STUDENT_____ DATE_____

TRAINING SUPERVISOR_____

INTERNSHIP COORDINATOR_____

	Very Good	Good	Avr.	Below Avr.	Unsat.	Failure
A. ATTITUDE: What level of attitude is exhibited in carrying out the duties of the job?						
Interest in work	( )	( )	( )	( )	( )	( )
Cooperation with superiors	( )	( )	( )	( )	( )	( )
Cooperation with co-workers	( )	( )	( )	( )	( )	( )
Tact and courtesy	( )	( )	( )	( )	( )	( )
Able to accept criticism	( )	( )	( )	( )	( )	( )
COMMENTS:_____						
B. DEPENDABILITY: What is the degree of conscientiousness with regard to:						
Attendance	( )	( )	( )	( )	( )	( )
Completing work	( )	( )	( )	( )	( )	( )
Respecting rules and regulations	( )	( )	( )	( )	( )	( )
Contributing to a "team"	( )	( )	( )	( )	( )	( )
Tardiness	( )	( )	( )	( )	( )	( )
COMMENTS:_____						
C. QUALITY OF WORK: What level of desire and ability to meet or exceed established quality standards is shown?						
Hardware:						
Workmanship	( )	( )	( )	( )	( )	( )
Accuracy	( )	( )	( )	( )	( )	( )
Neatness	( )	( )	( )	( )	( )	( )
Performance under pressure	( )	( )	( )	( )	( )	( )
Documentation:						
Accuracy	( )	( )	( )	( )	( )	( )
Neatness	( )	( )	( )	( )	( )	( )
Performance under pressure	( )	( )	( )	( )	( )	( )
COMMENTS:_____						

SCHOOLCRAFT COLLEGE
COMPUTER SERVICE TECHNICIAN
COOPERATIVE INTERNSHIP
STUDENT RATING FORM
COMPS 265

	Very Good	Good	Avr.	Below Avr.	Unsat.	Failure
D. QUANTITY OF WORK: How well does the student's productivity meet established standards:						
Hardware:						
Production	( )	( )	( )	( )	( )	( )
Performance under pressure	( )	( )	( )	( )	( )	( )
Documentation:						
Production	( )	( )	( )	( )	( )	( )
Performance under pressure	( )	( )	( )	( )	( )	( )
COMMENTS:_____						
E. ADAPTABILITY: How quickly does the student learn and adapt to unfamiliar problems?						
Analyzes problems and proceeds to make corrections in an orderly manner	( )	( )	( )	( )	( )	( )
Figures other ways of doing a job when preferred means are not available	( )	( )	( )	( )	( )	( )
Reaction to a new situation	( )	( )	( )	( )	( )	( )
COMMENTS:_____						
F. INITIATIVE: To what degree does the student show initiative in carrying out the duties of the job?						
Ability to work without supervision	( )	( )	( )	( )	( )	( )
Readiness to do extra work	( )	( )	( )	( )	( )	( )
Readiness to assume responsibility	( )	( )	( )	( )	( )	( )
COMMENTS:_____						
G. PERSONAL APPEARANCE: How well does the student's personal appearance fit the employee norm?						
Appropriateness of dress	( )	( )	( )	( )	( )	( )
Grooming	( )	( )	( )	( )	( )	( )
Health	( )	( )	( )	( )	( )	( )
Poise	( )	( )	( )	( )	( )	( )
Personal habits	( )	( )	( )	( )	( )	( )
COMMENTS:_____						

SCHOOLCRAFT COLLEGE
COMPUTER SERVICE TECHNICIAN
COOPERATIVE INTERNSHIP
STUDENT RATING FORM
COMPS 265

H. CREATIVITY: How innovative (new ideas) is the student?

Very Good	Good	Avr.	Below Avr.	Unsat.	Failure
( )	( )	( )	( )	( )	( )

COMMENTS: _____

_____

_____

COMPREHENSIVE RATING: Job performance of the student?

NOTE: A failure in any one catagory may result in the student receiving a failing grade.

	Very Good	Good	Avr.	Below Avr.	Unsat.		Number of failures
Total number checked:	( )	( )	( )	( )	( )	GRAND TOTAL	
Multiply by:	x 4 =	x 3.2 =	x 2.8 =	x 2.4 =	x 1 =		
YIELDS TOTAL POINTS:						= ( )	

GRAND TOTAL (Summation of TOTAL POINTS of first firve columns) _____

COMPREHENSIVE RATING = (GRAND TOTAL ÷ TOTAL POSSIBLE) x 100 = %

COMPREHENSIVE RATING = _____%

A score of 69% or below is not passing for program completion.

100% - 90% = A
89% - 80% = B
79% - 70% = C
69% - 60% = D
59%-Below = E

COMMENTS: Express the student's strong and weak points and include helpful suggestions in the areas of bench work, field work, paper work, preventive maintenance and effective use of resources (creativity).

_____

_____

_____

_____

DISCUSSED WITH STUDENT BY: _____ DATE: _____

STUDENT'S SIGNATURE: _____ DATE: _____

STUDENT'S REACTION TO THE RATING: _____

_____

COMPUTER SERVICE TECHNICIAN

COMPUTER SERVICE TECHNOLOGY PROGRAM (ASSOCIATE DEGREE) A Computer Service Technician services computer systems (microcomputers and equipment; including peripherals) to keep them operating efficiently. Routinely adjusts, oils, and cleans electromechanical parts, and checks electronic equipment for defective components or circuits. Troubleshoots and repairs computers, using test equipment such as voltmeters, ohmmeters, and oscilloscopes. May repair faulty circuits, solder broken connections, and repair mechancial parts, as needed. Assists in installation of new equipment.

First Year

Fall Semester		Winter Semester	
COMPS 105	Basic Electricity 5	ELECT 126	Electronics Fab. & Assy....3
*MATH	5	ELECT 222	Digital Circuits.....3
ELECT 116	Diodes & Transistors....3	ELECT 114	Intro. to Microprocessors..3
*ENG	3	*ENG	3
	16	COMPS 125	Technical Programming.....3
			15

Spring Semester

ELECT 209 Amplifiers.....5

Second Year

ELECT 223	Digital Logic Circ.....5	COMPS 245	Computer Peripheral Service & Repair.....4
ELECTIVE	3	COMPS 265	Circuit Analysis and Repair Internship.....6
COMPS 145	Computer Service and Repair.....4	POL S 105	Survey of Am. Gov't.....3
	12		13

*6 hours of English and 4 hours of Math are required. Course selections depend upon ASSET test scores.

SCHOOLCRAFT COLLEGE PROGRAM EVALUATIONS

Schoolcraft College used the "MANAGER" system for final program evaluation. The Michigan Analysis Network and General Evaluation Report system (MANAGER) has the potential for enabling Michigan community college educational leaders to: 1) enhance their process of management decisions resulting in greater institutional stability and 2) successfully account for the use of all resources. MANAGER can enable a college to institutionalize the planning procedure and to structure and refine college goals and program objectives through an understanding of: 1) valid data generated by Michigan Student Information System (MISIS), 2) perceptual information gathered by Program Review of Occupational Education (PROE), and, 3) financial data gathered by the Activities Classification Structure (ACS).

Schoolcraft College decision-making and program evaluation can be improved with common sense and a systematic review of outcome data; also, student and educational personnel perceptions can be demonstrated, program cost described, and implications of alternative plans envisioned.

The MANAGER system provides this approach to institutionalize an evaluative environment so the entire organization can better analyze information pointedly and regularly. It is this college's intention to begin to fully evaluate this program after two-years of operation, about September 1987.

SCHOOLCRAFT COLLEGE CURRICULUM INSTRUCTION COMMITTEE

Schoolcraft College uses committee oriented planning procedures to identify, describe, propose, and review all new programs. A curriculum instruction committee, composed of a cross-section of various college divisional employees, initially proposes programs, which in turn are researched and reviewed by various subcommittees. This entire planning process includes checks and balances to insure that existing or anticipated college resources, talent, facilities, academic goals, and community needs are all considered. Time lines for proper program inceptions are monitored to insure quality course construction and development, college catalog entry, articulation, information dissemination and inclusion of data into all appropriate state reports. This entire process consumes about eight months and is repeated annually.

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MINUTES OF THE COMPUTER SERVICE TECHNICIAN AD-HOC COMMITTEE

April 25, 1985 - 1:30 p.m., A520

MEMBERS PRESENT: Bauer, Demski, Doty, Kellog, Puhlman, Waters, Wale, Feenstra

Meeting was called to order by temporary chair, F. Feenstra at 1:31 p.m.

Charge of the Committee was presented.

1. Materials were disseminated. After discussion, Sean Doty was elected Chairman by acclamation. At this time, Mr. Doty chaired the committee. There was a call for the discussion of the overall intent of providing a Computer Service Technician program. The following were the main points:

   a. Microprocessor repair is not necessarily computer repair. There are microprocessors in almost every appliance and automotive product.

   b. Our program should educate persons in the repair of personal computers, business and industrial computer control systems.

2. The goal statements have been revised as follows:

   Upon the completion of the Associate Degree, the students will be able to:

   1. Perform tests on mechanical, electrical, or thermal components or systems; prepare appropriate technical reports covering the tests.

   2. Obtain, select, compile, and use technical information from precise measuring and recording instruments.

   3. Analyze and interpret information obtained from precise measuring and recording instruments and special procedures and techniques.

   4. Prepare or interpret engineering drawings and sketches; write detailed specifications or procedures for work.

   5. Plan, supervise, or assist in the installation and inspection of micro computer apparatus, equipment, and control systems.

   6. Operate, maintain, and repair micro computers and equipment, including periphal systems.

   7. Understand the concept of machine language, assembly language, higher level language and general operating systems.

3. The requested equipment was revised as follows:

Chairs	24	$ 3,000.00
Work Benches	6	1,260.00

continued....

Computer Service Technician Ad-Hoc Committee, cont.

Computer Repair Trainers	6	$ 15,000.00
Disk Drive Trainers	6	9,000.00
Oscilloscopes	6	13,200.00
Logic Analyzers	6	18,000.00
RS 232 Breaker Boxes	6	1,800.00
Printers	6	3,000.00
R.G.C. Monitor	6	3,000.00
Modems A & B Sync	6	4,200.00
Hard Disk Drive	1	3,850.00

4. There was general discussion on the proposed course sequence.

5. The revised goal statements and revised equipment list will be submitted through channels to the state.

Next meeting is scheduled for September 12, 1985 at 1:30 p.m.

Meeting adjourned at 3:15 p.m.